Attorney's Docket No. 1017750-000801

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	**MAIL STOP AMENDMENT**
Jose L. Ramos	Group Art Unit: 2618
Application No.: 10/618,708	Examiner: YUWEN PAN
Filed: July 15, 2003	Confirmation No.: 4909
For: METHOD AND APPARATUS FOR TRANSMISSION AND RECEPTION OF SIGNALS	

DECLARATION PURSUANT TO 37 C.F.R. § 131 BY MIRIAM M. FABREGAS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Miriam M. Fabregas, declare as follows:

1. I am a citizen of the United States of America.

2. As a senior paralegal, I maintain records of invention disclosures including the invention disclosure records for the above-captioned U.S. patent Application Serial No. 10/618,708 ("the '708 application"), assigned to Lockheed Martin Corporation, Bethesda, Maryland. The Official Filing Receipt received in connection with the '708 application indicates that the '708 application was filed on July 15, 2003, and identifies Jose L. Ramos as the sole inventor.

3. The '708 application was prepared and filed in the U.S. Patent and Trademark Office by our outside law firm, Burns, Doane, Swecker & Mathis, now Buchanan, Ingersoll & Rooney. Patrick C. Keane, Esquire and Mr. Michael Weinberg of Buchanan, Ingersoll & Rooney recently contacted me regarding an Office Action received in the '708 application dated April 6, 2009. The Office Action cites U.S. Patent No. 7,079,815 ("the '815 patent"), the first page of which indicates that it was filed on May 20, 2003 and granted on July 18, 2006 to Pozgay et al.

4. Mr. Keane and Mr. Weinberg requested that I review the invention disclosure records that I maintain for the '708 application, for purposes of establishing that the invention disclosed and claimed in the '708 application was conceived prior to the filing date of the '815 patent.

5. The invention disclosure records for the '708 application are attached hereto as Exhibits 1.1 ("Invention Disclosure", 7 pages) and 1.2 ("Slides", 12 pages). Exhibits 1.1 and 1.2 have been redacted to remove date information and other information not relevant to the purpose of this declaration. The dates on Exhibits 1.1 and 1.2 have been removed, but each date is prior to the May 20, 2003 filing date of the '815 patent.

6. I hereby declare, upon information and belief, that the attached invention disclosure records for the '708 application were received by my office prior to the May 20, 2003 filing date of the '815 patent, and that the invention was at least constructively reduced to practice with the filing of the '708 application on July 15, 2003.

7. I hereby declare that all statements made herein of my own knowledge are true and that all statements were made on information and belief and are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 7/6/09

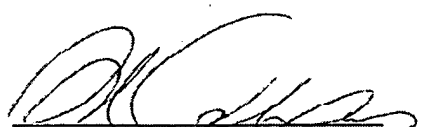
By: 
Miriam M. Fabregas

EXHIBIT 1.1

Disclosure ID: MC-02346
Disclosure Title: AlGaN Shared Channel Transmit / Receive Module
Status: File

Administration Remarks:

Classified Information Requirements

[redacted]

Disclosure Information

Invention Title:	**Site Name:**
AlGaN Shared Channel Transmit / Receive Module	Electronic Systems - Missiles and Fire Control - All Sites (MC)
Disclosure No:	**Receiving Date/Time:**
MC-02346	[redacted]

[redacted]

Inventor Information

Inventor Name:	**Inventor Type:**	**Emp. No.:**	**Div./Dept.:**	**Bldg:**	**Phone:**
Ramos, Jose L.	Primary	[redacted]			

[redacted]

[redacted]

Final Recommendation Information

[redacted]

Basic Disclosure Information

What is the Problem and/or Purpose of the Invention*:

Current Transmit / Receive Radar Module(s) are composed of many high cost parts and some of that cost includes protection of the Receive function of the module using a power limiter. The purpose of this invention is to: Reduce parts count in Transmit / Receive Radar Module(s),reduced size requirement for higher performance, more robust receiver functionality with capability of higher input power levels and module immunity to high radiation levels exposure.

[redacted]

Please Provide a Summary of the Invention (How is the Problem Solved?)*:

Using AlGaN Wide Band Gap devices in a Transmit / Receive Radar Module configured in the shared channel architecture which uses common components for both Transmit Function and Receive Function thereby reducing parts count with the benefit of also making a more robust Receive Function capable of higher input power levels.

If this Problem Has Been Solved Before, How Was it Solved?*

To my knowledge there are separate components for the Transmit Function and separate components for the Receive Function. The receive function was protected from high power levels by more components such as limiters but module failures are still common.

Please Explain Why Your Solution is Better*:

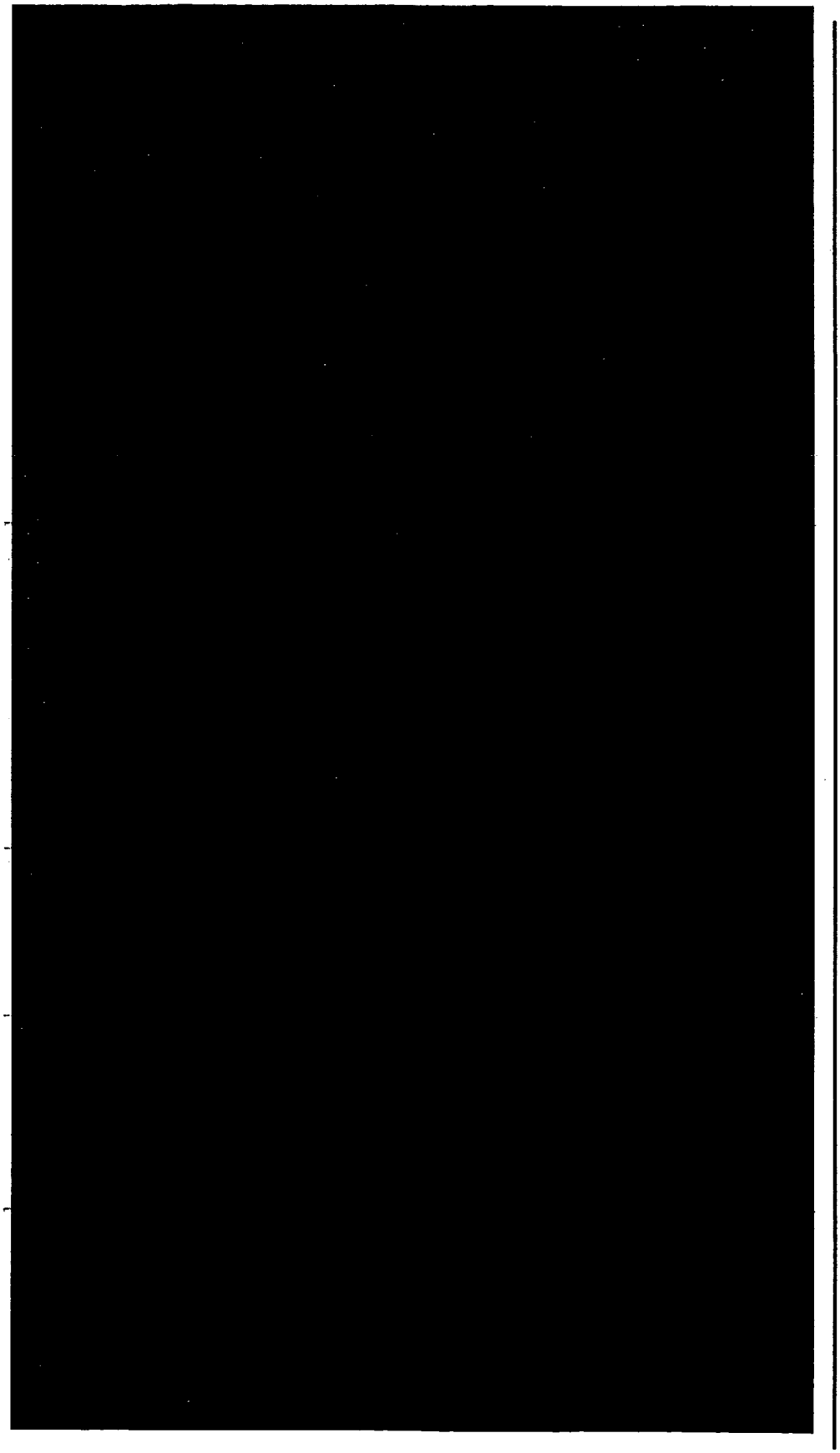
The systems Radar Microwave components count is reduced, the area needed for same functionality is reduced, the receive function is more robust and can function with higher input power and the components are immune to high radiation exposure levels.

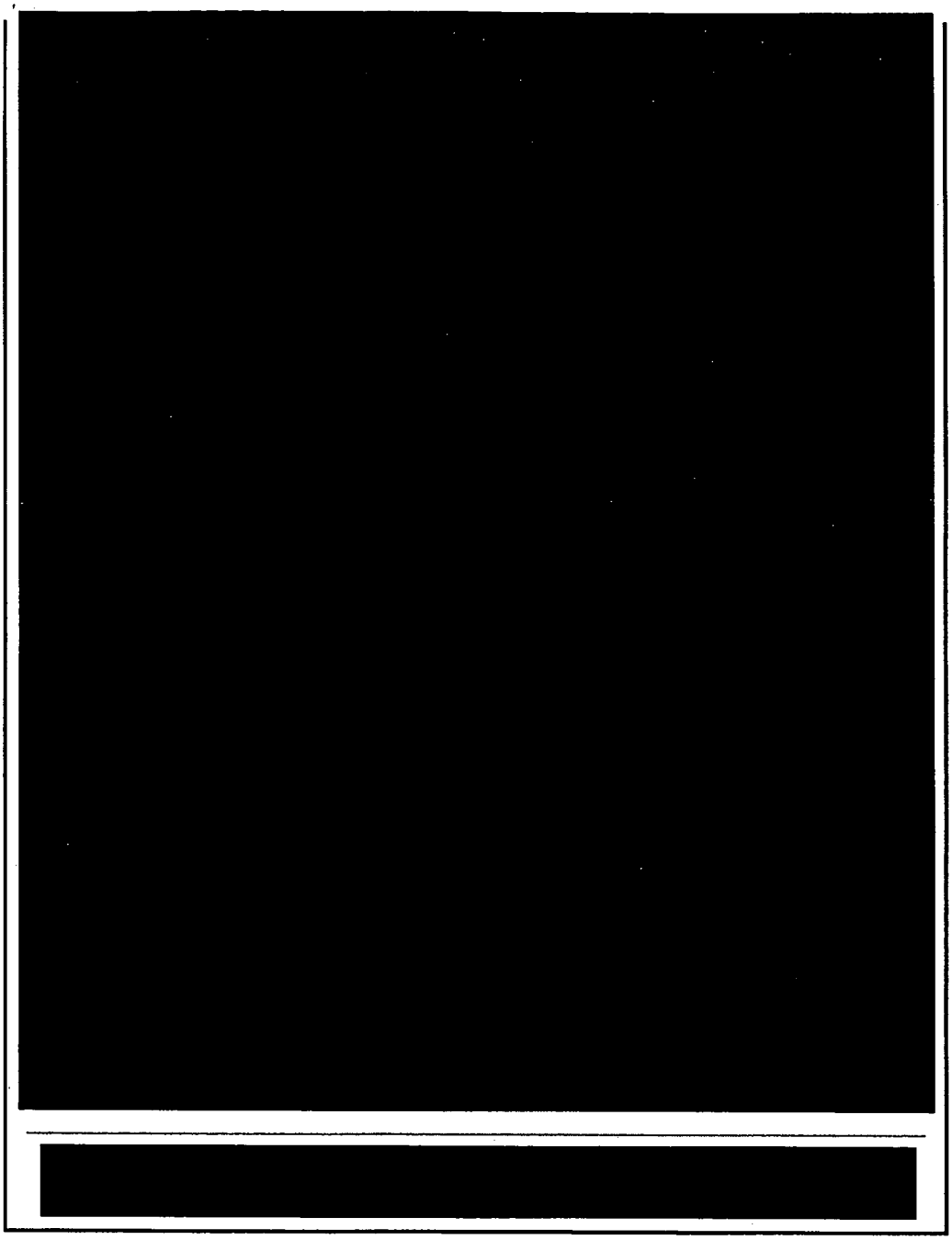
[redacted]

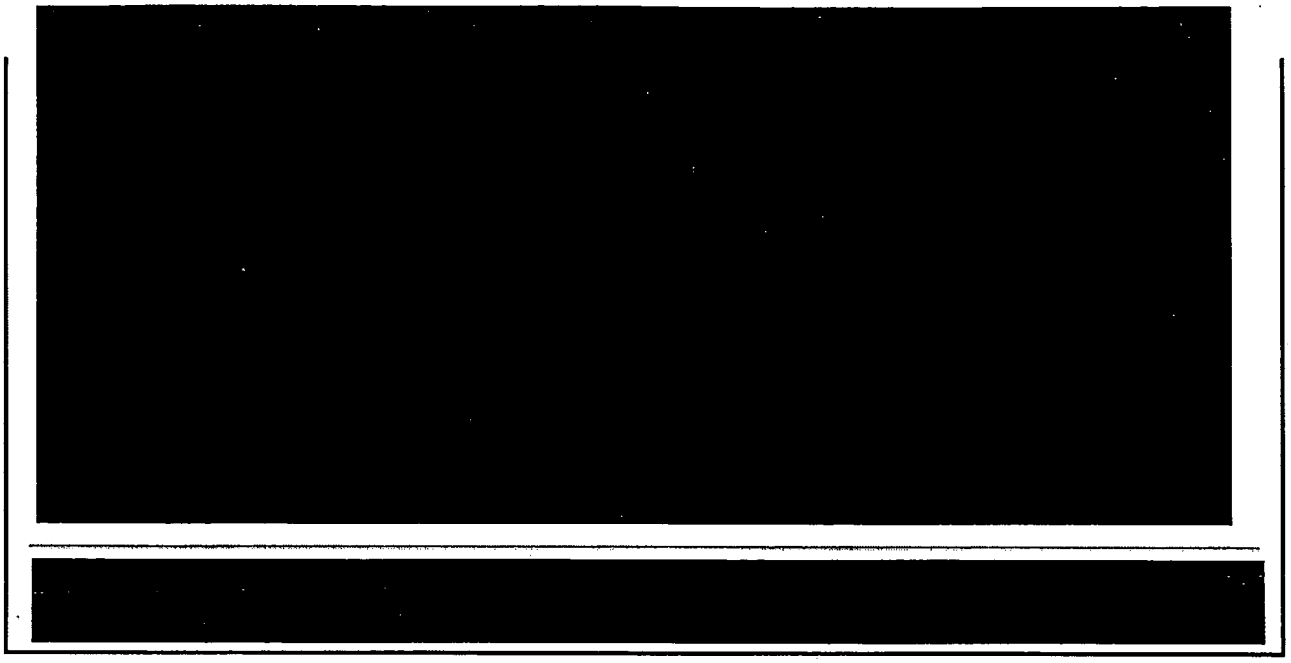
[redacted]

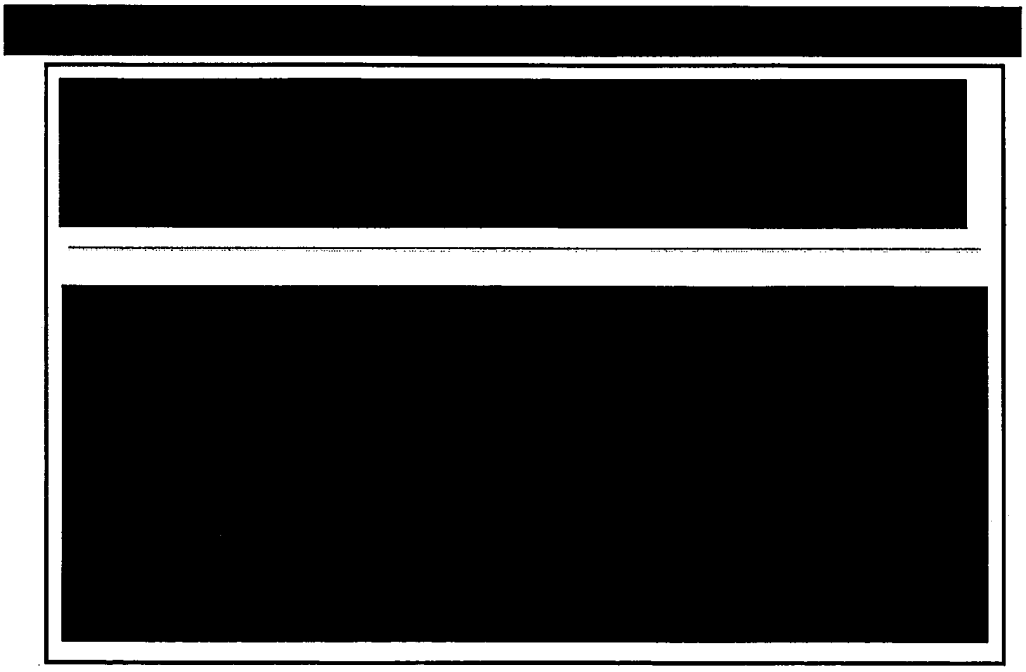
[redacted]

[redacted]









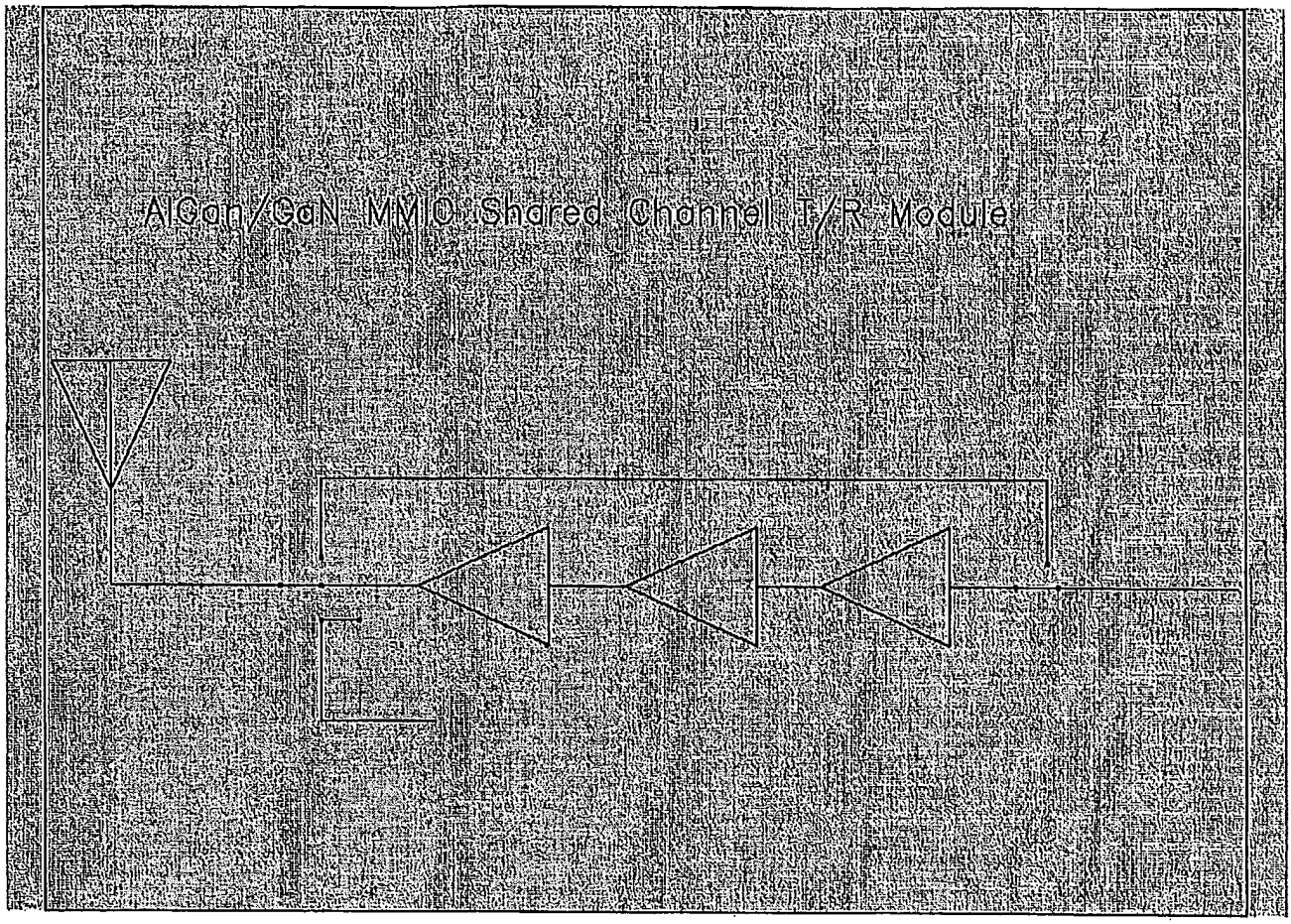

AlGaN/GaN MMIC Shared Channel T/R Module

EXHIBIT 1.2

Missiles and Fire Control

AlGaN Shared Channel Transmit / Receive Module

Jose Ramos

[redacted]

[redacted]

[redacted]

[redacted]

File No: EM01973

Summary & Abstract

[redacted]

Summary of the Invention

In present day radar systems embodiment of the system is comprised of a high power transmit channel and a separate low noise receive channel architecture. This separation of functions allows implementation of function specific component technology.

AlGaN is a Wide Band Gap technology (3.49eV)which has both the high power (power density 10 times higher than GaAs Technology which enables smaller devices with higher RF output power) and low noise characteristics comparable to GaAs Technology that allows dual role use in a shared channel architecture which satisfies the requirements of the radar equation for MDS(minimum detectable signal). $R_{max}=[P_tG^2\lambda^2\eth]^{1/4}$

$$\overline{[(4\pi)^3S_{min}]^{1/4}}$$

[redacted]

[redacted]

Abstract

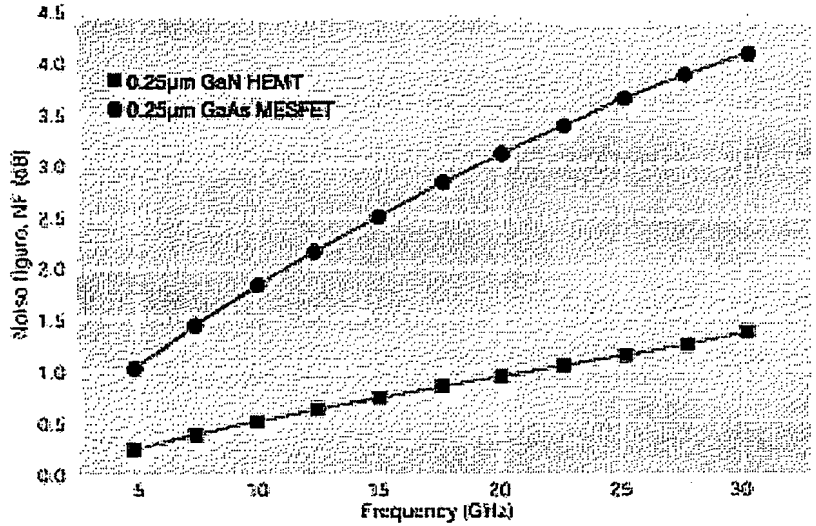
The radar signal pulse waveform is injected through SPDT (single pole double throw) switch A into shared channel and amplified by AlGaN Wide Band Gap HEMTs (High Electron Mobility Transistors) or AlGaN MMICs (Monolithic Microwave Integrated Circuits). The high power amplified signal is directed by DPDT (double pole double throw) switch B to antenna for transmission. Switches A and B are time controlled to multiplex (switch) into the receive configuration allowing the low power reflected radar return signal received by the antenna to pass through switch B , path Rx and switch A into the shared channel where the low power signal is amplified and redirected by switch B to be further processed. The multiplexing of the switches is timed with the radar pulse generation and reception to allow for reflected target return processing of range ($R=c\Delta t/2$), motion(Doppler Shift; $f_d=(2v_r/c)(f_o)$ and target signature. This architecture utilizes the small signal (low power) linear amplification parameters and low noise parameters of the Wide Band Gap HEMT amplifiers as well as the high power (large signal) parameters of Wide Band Gap HEMT amplifiers.

[redacted]

[redacted]

Low Noise performance (Important parameter for receiver dynamic range to detect low power return signals). Comparisons to current technology are shown in figure 4 and Device I/V (Current/Voltage) and RF Power input compression curves are shown in UCSB Slide.

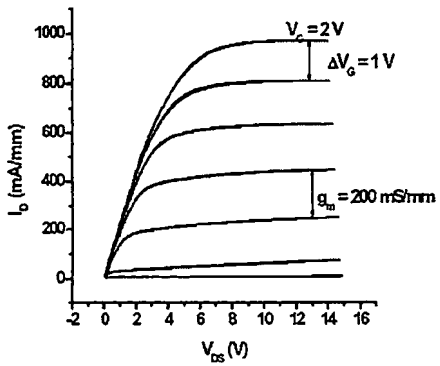
Figure 4:

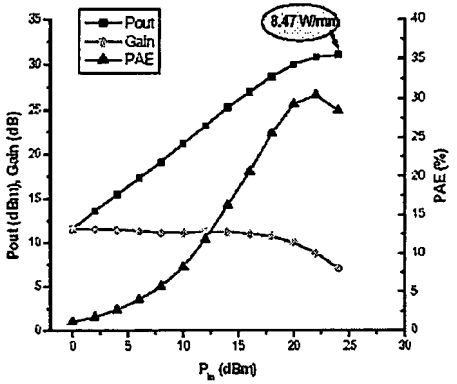


[redacted]

[redacted]

UCSB Device Performance of AlGaN/AlN/GaN HEMT





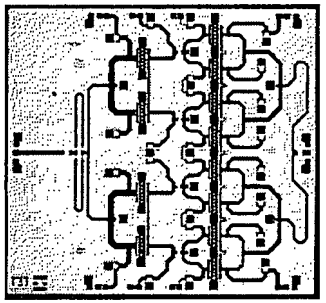
- I_{max} = 950 mA/mm
- g_m = 200 mS/mm
- 8.47 W/mm with a PAE of 28% @ 8GHz
- Bias: class AB at 45 V × 160 mA/mm
- Gate dimension: 0.7×150 μm²

[redacted]

[redacted]

AlGaN higher power density enables smaller MMICs with higher power output

20 Watt X Band AlGaN / GaN MMIC 4mm^2

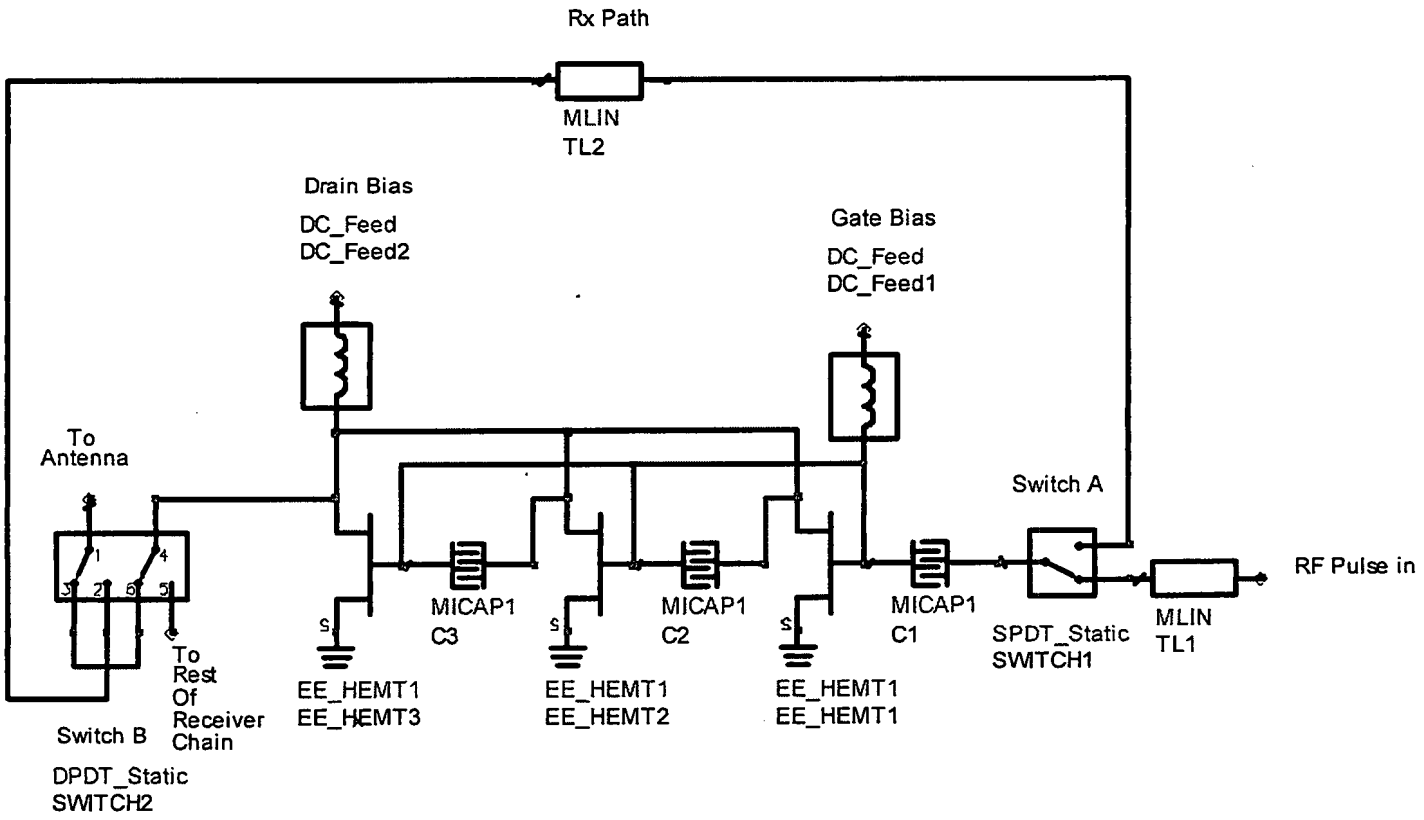


5 Watt X Band GaAs MMIC 22mm^2

[redacted]

[redacted]

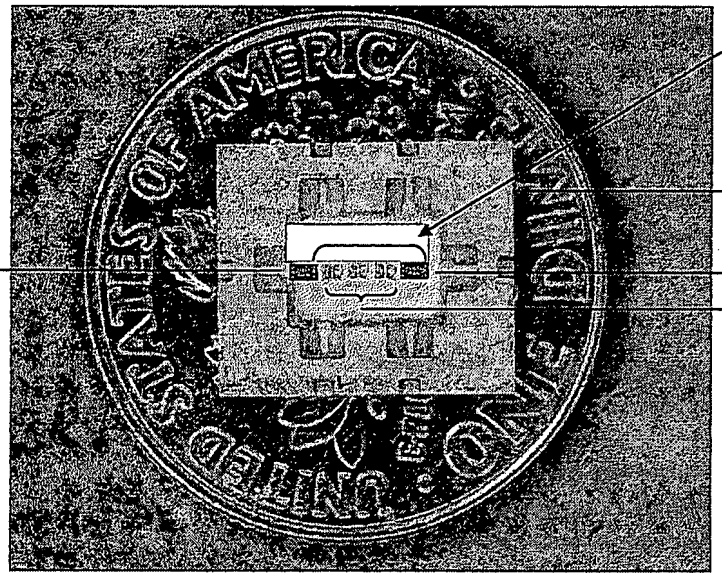
AlGaN HEMT Shared Channel Schematic



[redacted]

[redacted]

X Band AlGaN Micro Shared Channel T/R Module



[redacted]

Background / Problem to Solve

[redacted]

What is the background of the invention; what program or project were you working, etc.?

IRAD on Wide Band Gap Technology initiated realization of new architecture.

Describe problem trying to solve and how does your solution differ from the other solutions, if any, to the problem

Lowering the costs of radar platforms by designing in multi functional component roles and concurrently designing more robust systems that will have superior performance in a combat theater.

[redacted]

Marketplace

[redacted]

[redacted]

[redacted]

Other Information

[redacted]

[redacted]

[redacted]

Recommended Countries

[redacted]

[redacted]